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THE AMERICAN APPROACH TO AERIAL
RECONNAISSANCE AND OBSERVATION
DURING WORLD WAR I

A Research Paper

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Preface

With United States entry into World War I on 6 April 1917, a proud history was established in organized reconnaissance. I chose the subject of the *American Approach to Aerial Reconnaissance and Observation* because of my background in US Air Force reconnaissance operations and employment. I found the subject engaging from a historical perspective and relevant to my “roots” as a “recce” aviator. I found it necessary however, to limit my research to the vehicles and training America employed during the Great War, forgoing any discussion of actual battle employment.

I would like to thank the staff of the US Air Force Historical Research Agency for the tremendous support I received. These historical works were critical to my study of World War I and I had full access to this extensive collection. I would also like to thank the librarians of the Fairchild Library. Their assistance was most helpful in locating published literature on the subject and assisting me in research methodology. Finally, I would like to thank my Faculty Research Advisor, Dr. Michael Grumelli, Air Command & Staff College Faculty, for his outstanding support and guidance in my project. He helped me stay focused on the task at hand and critically guided my examination.

Abstract

This premise of this report is that "observation" was the motivation for the first employment of balloons and aircraft, and that in World War I, Allied assistance and equipment were absolutely crucial to the development and employment of the US Army Air Service.

This work will look at two main areas. First, the types of observation vehicles employed in World War I and secondly, the tremendous role the European Allies played in providing equipment, training, instruction, and combat experience to American aerial forces, both at home and abroad.

"The purposes of observation were to control friendly artillery fire and, through photographic and intelligence missions, to observe and report on friendly troop locations and movement, enemy ground and air activity, the terrain, and related matters. Most observation, especially where distance was a factor, was handled by two-seater aircraft, equipped with radio and visual signal equipment, armed with fixed guns in front and movable guns in the rear cockpit, and carrying, when necessary, photographic equipment; the remaining observation was carried out by observers in captive balloons. Now that the use of cavalry was not longer feasible, air observation was the 'eyes of the army'."¹

Notes

¹Albert F. Simpson, ed. *The World War I Diary of Colonel Frank P. Lahm, Air Service, A.E.F.*, (Historical Research Division), 11.

Chapter 1

Introduction

Know the enemy and know yourself; in a hundred battles you will never be in peril.

— Sun Tzu

A knowledge of enemy strength and intentions has always been essential to the formulation and execution of successful plans for military operations.¹ Successful war has never been won on a hunch. Information is the basis of every military action; for without information, military decisions become a matter of guesswork. Without sufficient military information from successful observation, there is no forming an intelligent military decision. “Without this—we guess.”²

On 18 July 1914 Congress enacted legislation creating the Aviation Section, United States Army Signal Corps. This new section was in charge of “all matters pertaining to military ballooning, air machines, and all kindred subjects.”³ The basic function of the Air Service was to provide additional safety for the infantry by gathering information. Although some faltering steps were taken, little progress was made toward developing an observation service for the ground forces prior to United States entry into the Great War in April 1917.⁴

United States Army aviators had their first chance prior to American entry into World War I to test their aircraft under battle conditions. During April 1915, Pancho Villa and

his Mexican bandits engaged in a number of border raids into Texas and New Mexico. A detachment from the 1st Aero Squadron was sent to Brownsville, Texas, to provide reconnaissance support. These airmen flew reconnaissance missions to determine the exact location of Pancho Villa's trenches around Matamoras and to observe surrounding territory. The objective was to use the airplane to direct artillery fire and locate enemy gun positions. By May 1916 the 1st Aero Squadron, under command of Captain Benjamin D. Foulois, reached its maximum strength of 16 officers and 122 enlisted men.⁵ Brigadier General John J. Pershing, overall commander of the punitive expedition, was proud of the aircrews but displeased with the performance of the antiquated aircraft which were unable to meet the demands of excessive heat and dust, gusty winds, and the soaring altitudes flying over the Sierra Madre Mountains. In comparison to aerial operations going on in Europe at the same time, "the 1st Aero Squadron's accomplishments were extremely meager."⁶ The Mexican expedition ended in February 1917, and two months later the United States was at war with Germany. In spite of this inauspicious start, the United States entered World War I committed to military action in the air as well as on the land and at sea.⁷

When the United States declared war on Germany there were 65 aviators in the US Army Air Service. None of them had ever flown a modern service aircraft and almost all were trained with flight controls completely different from those used in Europe. No observers had been trained and no advanced observation training of any sort had been accomplished.⁸ According to a US Army General Histories report: "At least one thing is certain: at the outbreak of war little or nothing was on hand, either of planes, fields, instructors, curricula, or—most important of all—experience that would indicate what

was needed." The report continued: "The United States had never trained an aviator for actual combat overseas....Consequently, the first men charged with the training program had to learn by trial and error before teaching others. Probably no one in American aviation realized what difficulties lay ahead."⁹

Although battle results from the Mexican Expedition were not as impressive as hoped, a large number of officers who saw service in Mexico played vital leadership roles in France during the war. The United States came out of this expedition with at least a good set of ideas on how to operate and air leaders who understood the need to organize, equip, and train air units for tactical missions.¹⁰

The purpose of this report is to discuss the near complete reliance of the US Army Air Service in World War I on the Allies for observation training, machinery, combat experience, and doctrine. America's contribution to aerial reconnaissance and observation was relatively insignificant. Air Service equipment was either borrowed, purchased, or copied from the Allies, and basically all training was provided for and organized by French and British air services. The American Air Service, because of shortages of aircraft, balloons, and supplies, flew European aircraft on the whole. The Air Service was also a hybrid of French and British doctrinal and tactical experience and American innovation.

This writing will look at three areas that continue to underscore the American reliance on her European Allies. First, the types of observation vehicles employed, namely balloons and aeroplanes. European equipment was primarily used because of the severe equipment shortages of American forces required for the observation role. Next, the contributions of the Allies with respect to training and experience will be examined. It will begin by looking specifically at balloon training, with a transition to aircraft training in

both the United States and overseas. Finally, this work will show how thoroughly reliant America was to the teaching methods and combat experiences of the Allies and the importance of advanced training overseas for battle preparation. By far, the most important assistance made by the Allies to the Air Service was the finishing flight courses given to aviators prior to arrival at the front. In the end, France and Britain's vitally important contributions to the US Army Air Service were immeasurable in enabling development of the American approach to aerial reconnaissance and observation in World War I.

Notes

¹Sam Hager Frank, *American Air Service Observation in World War I*, Forward.

²Harold E. Porter, *Aerial Observation*, (Harper & Harper Brothers Publishers, 1921), Preface.

³Marsh, 47

⁴Maurer Maurer, *The U.S. Air Service in World War I*, 4 vols. (Washington D.C.: Air Force Office of History, 1978), 2:Preface.

⁵Frank, *American Air Service Observation in World War I*, 81.

⁶John L. Frisbee, *Makers of the United States Air Force*, (Air Force History and Museums Program, US Government Printing Office, 1996), 16.

⁷Frank, *American Air Service Observation in World War I*, 83.

⁸Maurer Maurer, *The U.S. Air Service in World War I*, 2:93.

⁹Juliette A. Hennessy, *The United States Army Air Arm, April 1861 to April 1917*, (The United States Air Force Historical Division, 1958), 197.

¹⁰James J. Cooke, *The U.S. Air Service in the Great War, 1917-1919*, (Praeger Publishers, 1996), 10.

Chapter 2

Observation Vehicles

Now anyone with experience of life in the forward area of battlefield knows that here is an area where life is stripped down to very real 'realities' and that, away out ahead of all other priorities, comes the question 'what is the enemy doing, where exactly is he, and where exactly are my people?'

Major General Jack Parham¹

The entry of the United States into World War I was greeted with much enthusiasm by its European Allies. Having joined Great Britain, France, and Italy in war against Germany and Austria, the US quickly drew plans for a robust air service that included observation planes and balloons. Composed of one squadron of obsolete airplanes, no machines fit for front-line service, no aviation accessory equipment of any value, no fundamental knowledge of air formulation, no pilot except those serving with the French or British capable of performing a battle mission, and a total force of 1,120 personnel, this was the US Army Air Service force that faced war against Germany in the air in April 1917.²

Shortly after the Great War began, trench warfare became the battlefield pattern dominated entirely by deadly artillery and machine guns; weapons which favored the defense. Unlike past military conflicts, these lethal implements of war made it difficult to obtain information on the enemy because of the unique elements of trench warfare that

allowed very little exposed movement for ground observance. Both sides quickly adopted the relatively new ability of aerial observation to provide answers about what the enemy was doing across the front lines. Aerial observation, either from balloons or airplanes, was used to collect information that ground commanders vitally needed and provide artillery gunners the opportunity to fire at targets that they themselves could not see. These observation vehicles also provided immediate damage assessment of artillery results.³

Although these observation vehicles provided seemingly solitary aerial services, they often complemented each other's ground preparation and airborne focus. This complementary relationship of balloon and airplane observers was performed by the balloon observer watching something for a long period of time and then the aircraft observer taking a closer look from overhead or from another direction. On the other hand, it was common place for the airplane observer to take pictures of the front to allow the balloon observer to quickly spot his target from an earlier picture. Also, it was not uncommon for the initial phase of an artillery shoot be directed by airplane and then turned over to a balloon observer.⁴

Balloons

The observation mission of balloons was to regulate artillery fire, conduct general surveillance of the enemy terrain, and report all enemy activity near the front lines by day, and to report all that could be seen at night.⁵ "Our operation of lighter than air craft was confined to captive balloons. The military function of captive balloons is to suspend an observer in the air in a fixed location for observation of the enemy and the regulation of

artillery fire. Such information gained by the observer is usually telephoned from the basket to the ground.”⁶

Balloons were used by the US Army as early as the American Civil War. Union armies employed balloons to view the lay of the land, providing contour maps and charts of the ground and fortifications. As early as 1862, balloons had directed Union artillery fire by use of the telegraph. The lessons were clear: air observation could be invaluable, and in directing artillery fire the balloon gave gunners greater accuracy than ever before.⁷

“When the US entered the war, it possessed one winch, one obsolete balloon, and five regular army officers who knew very little of military ballooning.”⁸ World War I was an artillery war that both sides quickly realized had the power to reach out and touch the enemy at great distances. Artillery was the war’s most important weapon, one that dominated battles and determined the outcomes. The essence of the balloon observer’s work was in support of the artillery.⁹ The balloon, a relatively stationary platform with increased viewing distances and instant telephone communications, helped make artillery fall with deadly accuracy. Well-aimed artillery was critical to pave the way for an infantry attack or provide protective fire while on defense. “In fact, the power of the balloon was such that reference to it crept into American jargon. ‘When the balloon goes up’ meant to the soldiers that a firestorm of artillery would ensue, and has been used by countless Americans since to infer impending disaster.”¹⁰

Balloons came in three general classes: Free, Captive, and Dirigibles. Free balloons were not generally used in World War I. Captive balloons were used by all armies engaged in the war. These captive balloons were attached to the ground via a cable, and connected directly by telephone to artillery batteries for control and direction of their

fire.¹¹ The Caquot captive balloons or "sausage" types were constructed by the French to act as a kite, making them steady in a strong wind. These balloons replaced the round type balloon which was difficult to handle and altitude limited in strong winds. The spherical shape caused the balloon to move about and rotate sometimes violently, because of lack of a stabilizing device. The French were the main supplier of balloons for the Allies, producing nearly 4,000 balloons of various types.¹² Captive balloons were routinely used in conjunction with airplanes, providing mutual information on the location of targets, yet they rarely worked in cooperation with airplanes.¹³

Dirigibles were lighter-than-air craft, equipped with engines and propellers capable of moving this ship as needed. Dirigibles could be further divided into non-rigid, semi-rigid, and rigid, based on the amount of framework used. Each had advantages and disadvantages, based on portability, speed, and cost. For example, the non-rigid dirigibles were relatively portable and economical, but not nearly as fast as the other two categories. On the other end of the spectrum, the rigid dirigibles were expensive and extremely difficult to ground transport, but enjoyed great speeds while airborne. Obviously, the semi-rigid dirigibles fell to the middle of all three categories.

The balloon service of the Air Service was organized in the spring of 1917 to assist the US Army's artillery branch. Five Army officers were ordered to Fort Omaha, Nebraska, to begin plans for a balloon school. None of these officers had any experience beyond balloon basics, and equipment and instruction were lacking. Meanwhile, Major Frank P. Lahm made thorough inspections of British and French schools, and began planning for the Balloon Service, American Expeditionary Force (AEF), which included a

school at Vadenay and a balloon center for men and equipment at Toul, both located in France.¹⁴

Major Lahm was the first American balloon officer to reach Europe in September 1917. Major Lahm immediately began to secure information about the organization and employment of balloons from the British and French. The 1st, 2d, 3d, and 4th Balloon Companies arrived in France in December 1917 and immediately were put into training at a balloon school near the French balloon training grounds at Vadenay. Just two months later, the 5th, 6th, 7th, and 8th Balloon Companies arrived and went to the front in July 1918, after training at artillery firing centers. At the end of the war, there were 25 balloon companies in France working with troops at the front and artillery firing centers, and at the balloon schools.¹⁵

Balloons as fixed aerial observation posts were attached to the ground by a steel cable, wound on the drum of a balloon truck. From about 4,000 feet, a balloon observer had an unequaled view of the battlefield that enabled him to collect information that no one else could provide. On a clear day he could see at least 15 miles deep into the enemy lines and could keep the battle zone under constant observation from dawn to dusk, able to notice the smallest changes in his sector of operations. Also, the relative lack of vibration and movement in a balloon on a clear day allowed the observer to use high powered binoculars, a feature the aircraft observer could not employ as successfully.¹⁶ On the other hand, altitude limitations and low height, long distances from targets, and effects from bad weather worked to the disadvantage of the captive balloonist. These conditions were better suited for the aircraft observer. In general, the balloon was highly effective for artillery direction at close range.¹⁷

In time, balloons themselves became the targets, both by enemy artillery attempting "balloon shoots" and by enemy aircraft once they were armed. The balloonist was not equipped to protect himself, necessitating early observation of enemy action to allow timely descent, anti-aircraft fire, and friendly pursuit aircraft to defend his position. As a last resort, the balloonist would be forced to rely on his parachute, but it was not completely reliable, and was only used for emergencies. The aircraft was the chief threat to balloonists, claiming the majority of balloon kills.¹⁸

Aircraft

"As a general proposition, the defect of the balloon is the beauty of the airplane, and vice versa. The airplane can't stay in one place, and the balloon has to; and there are moments when an Observer in either style of craft would give a million dollars cash to be in the other."¹⁹ The airplane's arrival allowed the observer an unobstructed view of whatever he wanted to see. Also, the ability to range behind enemy lines for information and an idea of what might come, provided for the idea of strategic reconnaissance. While the balloon provided information about the enemy force and movements over a wide radius, the field of operations was still limited. The observer needed a vehicle that would take him over the lines and beyond, deep behind the enemy lines for the purpose of obtaining direct observations. The airplane seemed well suited for this task and role.

Heavier-than-air craft made their military appearance in 1908 when the Wright brothers demonstrated their possibilities. The military possibilities of aircraft were immediately appreciated on both sides of the Atlantic.²⁰ As with the balloons, the first and foremost task required of the airplane observer was working with the artillery.²¹

Development of airplanes built prior to the war consisted mainly of the monoplane type construction. It was soon realized that the monoplane was not really suited for observation work, with the biplane being generally preferred. It was also quickly realized that the single pilot/observer had difficulties trying to fly and observe at the same time. The pilot was normally located over the wing, and could not see straight down and had problems observing the myriad of details and changes in the area below, all while trying to fly his aircraft. With the additional size and weight carrying ability of the biplane, a second man could be added to form an observation team. The observer's seat could also be moved toward the tail, allowing much better viewing of the target and surrounding area.²²

Early in the war, failure of landline and other communications during battle caused the Allies to employ means of aircraft and ground liaison to keep infantry commanders informed of friendly and enemy movements.²³ "Observation and reconnaissance are valueless without the means to report the results and the mobility of aeroplanes and the visual command of any aircraft are wasted without quick communications."²⁴ Many combinations of communication were used between aircraft and ground. These liaisons included: radio from the airplane to ground; visual signals from the airplane to the ground using rockets; dropped written messages; and visual signals from ground to airplane using rockets, bengal flares, lights, and signal panels.²⁵

Reconnaissance operations in World War I consisted of two main aspects—offense and defense. By 1914, the US Army had not developed an air policy, nor had the US considered any sort of air doctrine. Later that same year, Major George O. Squier, Chief Signal Officer, wrote a lengthy report on the British Air Service that concluded that air power was making a difference on the static battlefields of the Western Front. He found

that "For strategical and tactical reconnaissance the aeroplane is at present simply indispensable. In the present form of trench warfare the aeroplane is used to watch, sketch, and plot the development of the enemy's trenches day by day, and in most cases it is the only method of keeping informed of the progress of their preparations."²⁶

When it was decided to launch an offensive, aerial reconnaissance provided maps, photographs, and observations from immediately in front to deep behind enemy lines of terrain, trenches, routes of approach, barbed wire entanglements, machine gun emplacements, and enemy headquarters. These objectives were repeatedly photographed, recorded, and examined. This information was a key part of intelligence gathered for artillery preparation for an offensive action.²⁷

When the army was on the defensive, the observer had no plan of battle to guide him and he had to take things as they came. From the time the enemy began battle preparations until the actual advance, the observer's work was almost continuous. His main goal was to learn which direction the enemy was coming from and get this information reported immediately.²⁸

Observation and reconnaissance missions for the artillery, photographic reconnaissance, short-range and long-range reconnaissance (or grouped together as visual reconnaissance), and the contact patrol were the principal tasks of the Air Service on the Western Front.²⁹ Short-range reconnaissance usually involved a single aircraft. The pilot and observer would pre-brief their mission, study details of locality, check on the aircraft and equipment, and sign out at the operations assembly area before flight. Once airborne, the observer would accomplish a radio check and wait for instructions from the ground to proceed, then in coordination with the pilot, proceed on the mission. Flight orders

included direction to immediately report to division command by wireless radio any abnormal aspect of the enemy's sector, and if the situation required, assist the artillery in reacting by means of rapid adjustment of zone fire. Once complete with the mission, the team would check in, notifying the operations room of conditions encountered, any abnormal incidents, and flight duration. The observer was required to file a detailed report of record, which the operations and intelligence officers would then forward to concerned tactical authorities.³⁰

Long-range reconnaissance was essentially the same as short range except that no radio was used and for security, two or more pursuit type aircraft were provided for protection.³¹ Photographic reconnaissance closely paralleled the long-range mission. Two or more pursuit aircraft were usually provided, even when missions were in close proximity to friendly lines. The observer carefully examined the territory to be covered and reported all assessments to the photographic officer after landing. The photographic officer, not the observer, was responsible for photo interpretation. The observer was available to recount specifics of each picture if needed.³² There were three types of photography employed by the Allies; vertical, oblique, and stereoscopic. Generally it was best to take two sets of pictures, such as vertical and oblique, of the same subject to reveal almost all there was to see.³³

The artillery adjustment mission closely paralleled the short-range mission, in respect to preparations for flight. This was the original role of aircraft and balloon, of which all other forms of reconnaissance developed. In this role, the observer checked in with his respective artillery battery, and kept in contact throughout the flight. After landing reports

followed the same format as other reconnaissance flights, with the addition of number of shots fired and number of shots observed.³⁴

The contact patrol followed closely the tactics and procedures used in short-range missions. Additional preparation included the observer stocking the aircraft with Very pistols, cartridges of various numbers of stars, and metal containers for use in dropping messages to the command posts. Pre-flight liaison with divisional officers explained signaling procedures to conform with detailed plans.³⁵ The contact patrol was responsible for following and reporting on the infantry's progress. This mission generally brought the aircraft down to an altitude below 1,000 feet. This mission incorporated the airman into the land battle and was seen by some as the most interesting type of reconnaissance mission.³⁶ In this role, the contact patrol aircraft participated directly and actively in the land battle, not merely as an observation platform, but as an offensive weapon.³⁷ It could be a dangerous mission as well, occasionally being mistaken by friendly forces as an attacking enemy and being greeted with a volley of small arm's fire, however, the contact patrol was a standard component in infantry attacks.³⁸

The infantry contact patrol was an active part of offensive operations, acting as liaison with the front line and artillery support. According to the *Provisional Manual of Operations*, authored by Brigadier General William Mitchell, commander of the US Air Service: "Such close liaison and cooperation should exist between the infantry and the Infantry Contact Airplane that a message dropped near any group of infantry, however small, will be recovered by them and carried at once to a responsible officer....In this way minor units will have information of their immediate front of greatest value to them."³⁹

The origins of ground attack aviation are derived from the contact patrol mission which France perfected but stalemated after warfare was entrenched. General John J. Pershing, viewed the American Expeditionary Force as an offensive army. He placed his faith in maneuver warfare and believed he had to get his troops out of the trenches, attack over open ground, and take and hold key terrain and objectives. While this practice led to horrific casualties, Pershing set the doctrinal tone for the US Army. Pershing found himself fighting the first modern war, and he quickly understood the contributions air assets provided to the combat team.⁴⁰

Notes

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³Cooke, *The U.S. Air Service in the Great War, 1917-1919*, viii.

⁴Porter, *Aerial Observation*, 263.

⁵Maurer Maurer, *The U.S. Air Service in World War I*, 1:32.

⁶H. A. Toulmin, Jr., *Air Service American Expeditionary Force 1918*, (D. Van Nostrand Company, 1927), 263.

⁷Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 5.

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¹¹Maurer Maurer, *The U.S. Air Service in World War I*, 2:43.

¹²Kennett, *The First Air War*, 24.

¹³*Ibid.*, 29.

¹⁴Thayer, *America's First Eagles*, 282.

¹⁵Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 27.

¹⁶Kennett, *The First Air War*, 25.

¹⁷Porter, *Aerial Observation*, 258.

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²⁰Maurer Maurer, *The U.S. Air Service in World War I*, 2:47.

²¹Kennett, *The First Air War*, 33.

²²Porter, *Aerial Observation*, 43.

²³Maurer Maurer, *The U.S. Air Service in World War I*, 2:199.

²⁴Mead, *The Eye In The Air*, 35.

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- ²⁵ Maurer Maurer, *The U.S. Air Service in World War I*, 1:177.
- ²⁶ Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 7.
- ²⁷ Frank, *American Air Service Observation in World War I*, 60.
- ²⁸ *Ibid.*, 61.
- ²⁹ Maurer Maurer, *The U.S. Air Service in World War I*, 1:181.
- ³⁰ *Ibid.*, 178.
- ³¹ *Ibid.*, 179.
- ³² *Ibid.*, 181.
- ³³ Porter, *Aerial Observation*, 199.
- ³⁴ Maurer Maurer, *The U.S. Air Service in World War I*, 1:181.
- ³⁵ *Ibid.*, 182.
- ³⁶ Kennett, *The First Air War*, 38.
- ³⁷ *Ibid.*, 211.
- ³⁸ *Ibid.*, 38.
- ³⁹ Maurer Maurer, *The U.S. Air Service in World War I*, 2:297.
- ⁴⁰ Cooke, *The U.S. Air Service in the Great War, 1917-1919*, viii.

Chapter 3

Training

The Observer must be volunteer—and a little bit crazy.

— Captain Bachelier
French Mission to America¹

“Putting wings on men” was the duty of the American Expeditionary Force (AEF) Training Division. To produce the greatest number of qualified pilots and observers for the AEF in the shortest amount of time with the fewest casualties, was the primary aim of this division and one of the real accomplishments of the AEF.²

It was immediately evident that as much flight and observation training as possible would have to be completed in the United States. However, only preliminary training could initially be accomplished in the US because of the lack of instructors and machines. The need for large US training programs in Europe for advanced and specialized training was equally obvious. It was also necessary for training to be completed at allied schools to the greatest extent possible, until US training was in full operation.³ The burden of complete training was assumed by the United States at the beginning of 1918, with serious efforts made to carry out this commitment. However, it was not until near end of the war, in the summer of 1918, that the US was providing complete advanced and specialized training in America. Despite America’s good intentions, not a single observation crew member completely trained in the United States ever reached the front.⁴ Clearly, US

intentions and efforts were geared towards providing complete aviation training in the United States, but in actuality Allied and AEF schools in Europe bore the burden of most of the advanced training required.⁵

The Allies, who had been fighting for two years or more and were much farther advanced in military aviation, provided valuable information to help the US organize and build up its air service. They gave all the information and detailed data in their possession. Invaluable Allied contributions included aeronautical equipment, technical data for new developments, training, and tactical advice on how to employ aviation in battle.⁶

Balloon Instruction

The training of balloon observation and maneuvering was carried out both in the United States and the AEF at many locations, preferably in close proximity to artillery schools. This close cooperation between balloon and artillery training was mutually beneficial and fostered a close personal working relationship essential for successful field operations.⁷ Specialists from French balloon units helped train AEF officers at artillery firing centers. Although it was intended to give balloon observers complete training in the United States prior to going overseas, like aviation training, it was not at first possible without seriously delaying the arrival of balloon troops.⁸ Both the French and British initially assisted the Americans with instruction in the US. France supplied balloons and Britain provided observation instruction, but this training could not fully produce the numbers of balloon observers required for the war effort nor were they sufficiently trained to perform aerial observation to the level required with the AEF.⁹

Basic balloon training in the AEF started in France in the fall of 1917 and consisted of operation of the balloon winches, telephone line work, look-out work, machine gun use, and radio operation. Balloon units were immediately trained in artillery fire direction as soon as they arrived in France from the United States. Each company was sent to an artillery firing center until replaced by a newly arrived company from the US. Then the unit was assigned to a quiet sector on the front for battlefield training.¹⁰

This battlefield training was obviously risky with prevailing winds along the front blowing toward the enemy lines. If a balloon broke loose and started towards Germany, the observer was expected to get out at once and parachute in on the friendly side. If he drifted towards his own side, he was expected to bring the balloon down safely and not damage the balloon.¹¹

United States Air Service Instruction

The training segment of the US Air Service activity during World War I developed into an educational system on a scale much larger and more diverse than anyone anticipated. Since the requirements were necessarily rigid due to the complexity and importance of aerial observation, the selection of men for training as aviators was a complicated task. Training areas included teaching men to fly, to send messages by wireless, to operate machine guns in the air, to know artillery fire by its bursts, and to navigate hundreds of miles by compass. Additional training centered on aviation included photographic interpretation, aircraft maintenance, other instructors, and the maze of equipment and curricula involved with training.¹² None of these functions were in place at the outbreak of the war.

A contingent of 12 men, led by Major Raynal C. Bolling, best qualified to plan an aviation program left for France in June 1917 on a fact-finding mission. This mission consisted of aeronautical designers, designers, and motor experts along with a larger group picked from American factories for their knowledge of production methods. The mission also made plans for the training of flying personnel in Britain and France after they had received preliminary training in the United States. This arrangement was sporadic because of urgent requests by the Allies to use all shipping assets for infantry and armor to stop the German advance. These requests precluded the United States from sending officers and men to Europe for training.¹³

Prior to actual flight training, candidates completed a three-month ground school where cadets were introduced to the basic elements of military aviation. The actual flying instruction was divided into a primary phase and an advanced phase. The primary course lasted about eight weeks and taught the skills needed to operate airplanes. Simple demonstration of aerial maneuvers and a cross country flight led to a second lieutenant's commission and aviator's wings. The advanced training was infinitely more difficult. Advanced training included complex stunts, formation flying, and aerial gunnery.¹⁴ Eventually a third school was opened for observers in September 1917. "The prime requisites for admission to a school of observation are good education, sound judgment, quick perception, and iron nerve" said a bulletin from the War Department.¹⁵

In January 1918, a complete curriculum was drawn up with the help of the British Royal Flying Corps and the French Air Service. The progress of the war by 1918 had clearly demonstrated that the observer and observation pilot were "the most important and far-reaching which an Air Service operating with an Army is called upon to perform."¹⁶

The complete course lasted about 23 weeks and began with ground school that taught general military matters, radio, machine guns, and the interpretation of aerial photographs. Satisfactory pupils were then sent to a two week school of fire to learn how to operate with artillery and a final two weeks at aerial gunnery school for finishing touches. A fully trained observer was required to send and receive 8 words a minute by telegraph code, make 12 good aerial photographs on 18 assigned locations, locate and direct artillery fire, and conduct a prearranged shoot without error.¹⁷

The observer's course used in America, following Allied principles, was practically the same as that in France and England. Training included use of a 40 foot reproduction or "miniature range" of a sector from the Western front as seen from approximately 7,500 feet in altitude. This large painted fabric mock-up was surrounded by timbered spiderwork, overlooked by balconies for students and instructors. Forests, roads, fields, waterways, trenches, and towns were reproduced to enhance realism. "The students were there to direct imaginary fire of imaginary artillery upon an imaginary target."¹⁸

Each student had either a Morse key or buzzer to represent an airplane radio set and a student below him had tiny cardboard panels to represent the large cloth panels that were used by artillery units to signal the observer. The instructors operated tiny lights over and under the "range" to simulate shell bursts from the artillery. The lights flashed for only a second, so the student had to be alert, just like actual warfare. The observer student was trained to send down a series of signals to describe a target on the firing map, constantly updating the information, correcting the range and deflection until the artillery found its target.¹⁹

Flight training in observation planes often flew at low altitudes that required the pilot and observer to be well qualified to face this dangerous situation. From the beginning of schooling, both aviators were taught to be constantly alert for enemy aircraft. This meant habitually looking for both friendly and enemy aircraft—other aircraft were presumed hostile until proven otherwise.²⁰

The instruction of ground personnel was absolutely critical to the operation of Air Service Units. The first training school for ground officers was opened in September 1917, which included training for Supply Officers, Engineer Officers, and Adjutants. Additionally, in April 1918 at Wilbur Wright Field, Fairfield, Ohio, a six-week course for armament officers and men provided instruction on machine guns and bombs.²¹

In the same month at Camp Dick, Texas, special courses for compass officers and navigation officers were opened. Radio operations also required special instruction, with courses for all fliers, the crews receiving the messages on the ground, and the men responsible for the maintenance of radio equipment.²²

Another course that employed a similar triple instruction approach was for aerial photography. This included training for observers to operate the cameras in the air, intelligence officers on the ground providing photo interpretation, and other support personnel to aid in photographic development, enlargement, and printing, and keeping the equipment in serviceable condition. French and British aerial photographs were used at American training schools for the benefit of training.²³

A final area was the development of the ground maintenance force. Maintenance crews were required to keep airplanes and engines in prime condition, repair minor fabric tears, tighten up wires, strengthen struts, and ensure an overall safe airplane for flight.

Necessarily, a whole new series of schools was established to train aviation mechanics. Student mechanics were sent to factories to learn as much as possible about motors, ignitions, magnetos, propellers, instruments, machine guns, sail making, cabinet work, copper work, and welding. By the end of the war two large schools were in operation, capable of graduating 5,000 men every three months.²⁴

By war's end, the US Air Service had developed an education system complete in all details necessary to meet wartime demands. However, time and training were lost due to lack of facilities, equipment, and experienced instructors. Also, the standup of such a large organization introduced numerous bureaucratic challenges, which in turn shifted personnel and training locations numerous times, causing further delays. By November 1918, just over 900 officers had graduated from observation schools in America and only 509 of them had actually been sent to France.²⁵

American Expeditionary Force Instruction

The Training Section of the Air Service, AEF, was created in July 1917, responsible for "...all matters relating to training and organization of personnel in France, England, and Italy."²⁶ Although flight training in the United States was modeled after British and French training, there simply were not enough experienced instructors to handle the enormous levels of training required for combat. The pilots trained in the US had to be retrained in Europe, mainly because the machines used to train in America were so different from those used overseas that much of the value of home instruction was lost in the transition. Training in the US was thus looked down upon as unrealistic by those training and engaged in Europe.²⁷ Additionally, no pilot was qualified to fly the European

aircraft simply based on his training in America, in particular the advanced skills of gunnery or observation.²⁸ Schools of the AEF were required to bear a large portion of the training load, much more than ever contemplated. Also, the majority of instructors in the United States were embittered about remaining behind as instructors. Most felt the assignment, while obviously important, meant they would never reach the AEF and would adversely affect post-war promotions and possible assignments.²⁹

General John J. Pershing, Commander in Chief of the AEF, felt justified in his decision to build up American air power in France at the expense of training in the United States. This was a key reason training in the US essentially remained at the basic level, with advanced training mainly conducted in France. General Pershing continually spurned requests from Washington to return experienced aviators. Pershing simply kept officers regardless of the need in the United States, believing that the best men were needed in France to prepare aviators for the tasks of accomplishing missions and staying alive.³⁰

The AEF continually took advantage of French and British training offers, and when the Italian Government offered to train US pilots as well, the AEF sent a small number of American airmen to Italy. In June 1917, when it was realized that existing schools could not produce the numbers of pilots and observers General Pershing envisioned, the French agreed to provide the Americans a large training area at Issoudun, located 68 miles southeast of Paris.³¹

Issoudun was the greatest of the American training centers, created to finish pilots and observers, and later to completely train and finish new fliers.³² Though the training area had no barracks, hangars, buildings, or classroom facilities, Pershing liked the area. The large flat area surrounding the air field was ideally suited for emergency landings and

the local people enthusiastically welcomed the Americans and were more than willing to help build the field. They also welcomed the great financial benefit from the thousands of Americans that would be near their village.³³

Construction at Issoudun was slow starting due to lack of materials and personnel. The first French airplanes arrived in early October and a provisional school of the crudest type was operating by the end of the month. It was immediately clear that a great amount of time and effort would be necessary before the school was to operate effectively.³⁴ Training was carried out in whatever aircraft could be spared by the French. These spare aircraft were usually antiquated and poorly adapted for instruction. There were also more than 30 types of machines in use, causing logistical procurement problems and training inefficiencies.³⁵

The training of pilots was essential, but there developed a critical need to institute a program for training observers as well. The observers did not have to be a qualified pilot, so it was decided to get them from the ranks who were already well grounded in artillery targeting of the combat arms of the enemy ground forces. Urgent calls were made upon the US, but it was soon evident that sufficient personnel would not arrive in time to meet the requirement in Europe.³⁶ It was decided to call on all squadrons throughout the AEF to periodically recommend a few exceptionally qualified combat and support men who should be given aviation training as a reward for their previous excellent service.³⁷ A similar program was developed seeking volunteers or simply detailing artillery and infantry officers. The emphasis on artillery knowledge came from the French experience. General Pershing had French manuals for operations between air and artillery units translated into

English and distributed these throughout AEF schools, and encouraged the War Department to do the same at US schools.³⁸

In April 1918, the rating of Aerial Observer was created and distinctive wings were authorized. This official recognition of the importance of the observer's role and the need for selecting only the finest men brought better incentives to the training program.³⁹ In all, 1,250 observers began their training in AEF schools and 851 eventually graduated. There were two main factors for the large majority of men who did not complete training. First, very high standards required of the observer. Second, a lack of sincere motivation to complete the arduous and technical training involved. Near the end of the war the work of the observer was constantly becoming more diversified, important, and difficult—which was reflected in the vigorous training.⁴⁰

The observer also received training in aerial gunnery. Observers rehearsed taking apart and reassembling machine guns and practiced shooting weapons at numerous targets. Observers shot at conventional bull's eye targets, small free balloons, aircraft silhouettes, clay pigeons, and other targets around a lake so the splashes could teach accuracy. They ascended in flying boats and aircraft as training continued, increasing the difficulty. To further underscore the complete undertaking the Allies took to support America's war effort, Lieutenant Frank Gilchrist, an aerial observer training in France noted: "Finally, in other aircraft, we shot at life-size pictures of an airplane and occupant painted on a billboard. Our pilots on these expeditions were French aviators who had returned from the front as their nerves had gone to pieces. We bribed them with packages of American cigarettes to get close enough to enable us to get good scores."⁴¹

Training in Europe with the American Expeditionary Forces was absolutely critical to the war effort, particularly at the beginning of America's entry to World War I. Pilots and observers arriving in France from the United States were not sufficiently trained to perform aerial exercises at AEF schools, much less in actual combat. Crews had been instructed with obsolete equipment and methods, and were not well experienced in cross country flight, artillery spotting, and infantry contact. Training in the American schools also lacked basic fundamentals in compass work, formation flying, and aerial gunnery required on the front lines. These deficiencies, along with the long transit time required to ship personnel overseas further necessitated advanced training in Europe. "Sometimes the transition training took longer than learning to fly originally."⁴²

Notes

¹Porter, *Aerial Observation*, 53.

²Toulmin, *Air Service American Expeditionary Force 1918*, 277.

³Maurer Maurer, *The U.S. Air Service in World War I*, 1:93.

⁴*Ibid.*, 104.

⁵*Ibid.*

⁶*Ibid.*, 2:Preface.

⁷Toulmin, *Air Service American Expeditionary Force 1918*, 269.

⁸Maurer Maurer, *The U.S. Air Service in World War I*, 1:137.

⁹Thayer, *America's First Eagles*, 281.

¹⁰Frank, *American Air Service Observation in World War I*, 205.

¹¹Porter, *Aerial Observation*, 265.

¹²Frank, *American Air Service Observation in World War I*, 145.

¹³John W. Stuart Gilchrist, *An Aerial Observer in World War I*, 21.

¹⁴Frank, *American Air Service Observation in World War I*, 151.

¹⁵Porter, *Aerial Observation*, 54.

¹⁶Maurer Maurer, *The U.S. Air Service in World War I*, 1:104.

¹⁷Porter, *Aerial Observation*, 59.

¹⁸*Ibid.*, 60.

¹⁹*Ibid.*, 62.

²⁰Kennett, *The First Air War*, 33.

²¹Frank, *American Air Service Observation in World War I*, 159.

²²*Ibid.*

²³Maurer Maurer, *The U.S. Air Service in World War I*, 1:152.

Notes

- ²⁴Frank, *American Air Service Observation in World War I*, 161.
- ²⁵Ibid., 170.
- ²⁶Ibid., 172.
- ²⁷Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 23.
- ²⁸Toulmin, *Air Service American Expeditionary Force 1918*, 277.
- ²⁹Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 23.
- ³⁰Ibid., 22.
- ³¹Ibid., 20.
- ³²Toulmin, *Air Service American Expeditionary Force 1918*, 279.
- ³³Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 20.
- ³⁴Maurer Maurer, *The U.S. Air Service in World War I*, 1:97.
- ³⁵Frank, *American Air Service Observation in World War I*, 177.
- ³⁶Maurer Maurer, *The U.S. Air Service in World War I*, 1:105.
- ³⁷Ibid., 95.
- ³⁸Cooke, *The U.S. Air Service in the Great War, 1917-1919*, 23.
- ³⁹Frank, *American Air Service Observation in World War I*, 153.
- ⁴⁰Maurer Maurer, *The U.S. Air Service in World War I*, 1:105.
- ⁴¹Gilchrist, *An Aerial Observer in World War I*, 55.
- ⁴²Frank, *American Air Service Observation in World War I*, 206.

Chapter 4

Conclusions

I believe this function of 'seeing for the army' is the most important one that belongs to the aviation arm in warfare. Bombing, patrolling, and bringing down enemy aeroplanes are but trivial compared to the vast importance of knowing the exact positions of the enemy's forces.

—Captain Edward V. Rickenbacker¹
Fighting the Flying Circus

While bombardment and pursuit aviation of the American Expeditionary Forces caught the public's attention and subsequently received substantial elaboration by air power enthusiasts, it was the use of the airplane for close-support observation and reconnaissance that was the most significant in terms of achievement.²

The air units of the Great War were first and foremost collectors of information. Only secondarily were aircraft used as a destructive power. The importance of aerial observation was quickly realized, which led to each side trying to prevent the enemy observers from gathering intelligence. This led to the development of the "chasse" or pursuit aircraft, with the primary role of bringing down the observation aircraft. If the pursuit aircraft had the choice of attacking a similar type of fighter or an enemy's observation aircraft, it attacked the observation plane.³

With regards to aerial observation employment, the United States had little to do with the development of air doctrine in the Great War. America simply followed the design of

the Allies who had been competing with the Germans for over two years prior to US entry in the war. Doctrine and practice in observation and reconnaissance employment developed based on lessons learned from French and British experiences.⁴

The United States was entirely dependent upon the Allies for equipment and experience. The Allies made possible American Air Service participation in the first World War. In a tribute to the Allies following the war, Major General Mason M. Patrick, Chief of the Air Service, AEF, wrote: "From the time of our declaration of war they threw open to us their sources of information, cooperated with us in every possible manner, and supplied us with much of the material we lacked so sorely. France in particular, on whose ravaged soil the decisive battles of the western front have been fought, supplied us, in spite of her own vast effort and dire need, with material without which our Air Service would have found it impossible to operate. England and Italy likewise aided us to the full measure of their ability." General Patrick concluded: "In all of the relations between our Air Service and those of the other powers alongside of whom we fought, there was ever present the finest spirit of helpfulness and cordiality."⁵

Notes

¹Frank, *American Air Service Observation in World War I*, 391.

²Ibid., iii.

³Ibid., 389.

⁴Ibid., 393.

⁵Maurer Maurer, *The U.S. Air Service in World War I*, 1:163.

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